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Nätverk för Affärsutveckling
i Försörjningskedjan

NAF OFTP2 Webinar Del 3
(Version 04)

NAF OFTP2 Webinar

5 oktober 15.00 - 17.00	**Genomgång av aktuella förändringarna avseende X.25/ISDN från TeliaSonera. Genomgång av olika framtida kommunikationsalternativ med för- och nackdelar. Vilka är alternativen?** *Sten Lindgren, Odette Sweden* *Patrik Patriksson, TeliaSonera* *Mikael Carlsson, PipeChain* *Bengt Andersson, Scania*
19 oktober 15.00 - 17.00	**Vad är OFTP2 – översikt. Genomgång av olika funktioner i OFTP2-protokollet** **AB Volvo går live med OFTP2!** *Sten Lindgren, Odette Sweden* *Peter Nilsson, PipeChain* *Bengt Andersson, Scania* *Lars Cederholm, Volvo IT*
9 november 14.30 - 16.30	**Genomgång av hantering säkerhetscertifikat för OFTP2** *Sten Lindgren, Odette Sweden* *Håkan Enquist, Saab Technology och Handelshögskolan i Göteborg* *Lennart Jakobsson, Scania* *Jörg Walther, Odette International*
23 november 15.00 - 17.00	**OFTP2 – implementeringsaspekter.** **What is ENX?** *Sten Lindgren, Odette Sweden* *Peter Nilsson, PipeChain* *Lars Cederholm, Volvo IT* *Lennart Oly, ENX*
7 december 15.00 - 17.00	**Genomgång av några cases bland deltagande företag.** **In depth comparison of various file transfer protocols, (AS2 and more)** *Sten Lindgren, Odette Sweden* *Alla* *Ronny Samuelsson, PipeChain* *Gavin Fowler, Data Interhange*

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NAF OFTP2 Webinar

Genomgång av hantering säkerhetscertifikat för OFTP2

- Introduktion till dagens session
- B2B-kommunikation
- Internet som informationskanal
- Principerna för informationsskydd med PKI (Public Key Infrastructure)
- Administration av (säkerhets) certifikat
- General overview of status of OFTP2 implementation in Europe
- The role of Odette as a Trust Centre
- TSL Service
- Odette as a Certification Authority
- Automation and testing of the Exchange of Security Certificates

Sten Lindgren, Odette Sweden
Håkan Enquist, Saab Technology och Handelshögskolan i Göteborg
Lennart Jakobsson, Scania
Jörg Walther, Odette International

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Introduktion till dagens session

Introduktion

Webinaret

- Presentationer
- Frågor

Om området som webinaret behandlar

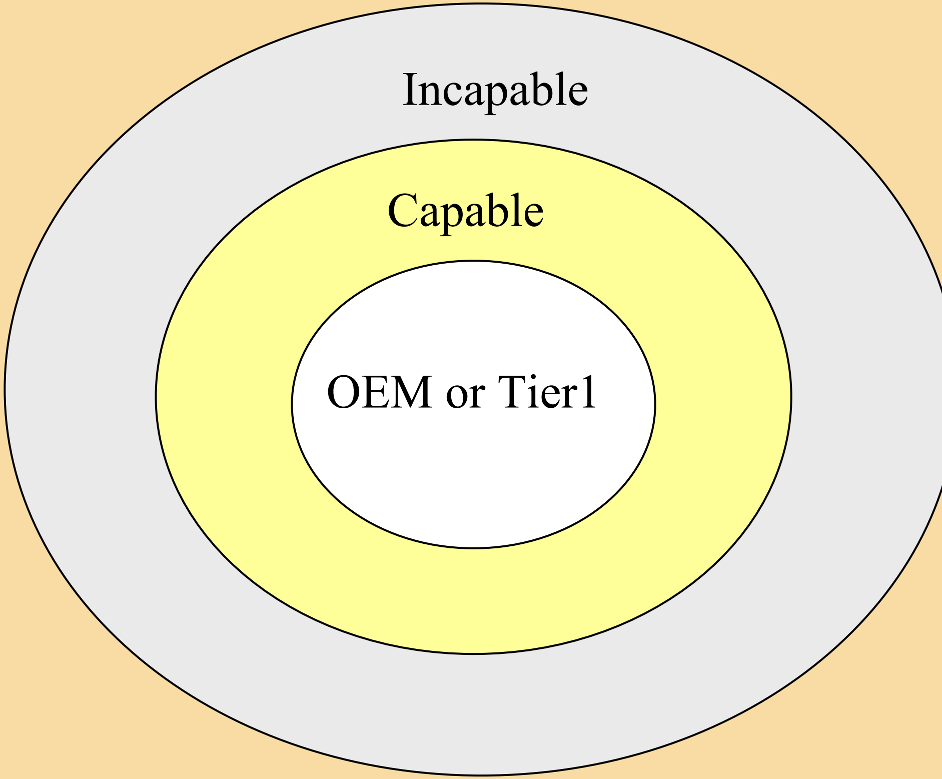
- Huvudsyftet är att beskriva de förändringar som är på gång
- Dessa är nära knutna till “svenska” fordonstillverkares övergång till OFTP2 över TCP/IP
- Dessutom är förändringar inom TeliaSonera tjänsteutbud en viktig aspekt
- Vi tar gärna emot kompletterande information och frågor från deltagarna i webinaret, det kan även gälla situationen ute i Europa och/eller vad OEM:s ute i Europa gör

B2B-kommunikation

e-Business maturity among trading partners

Capable Trading Partners:
Flexible, standards based B2B gateway
Always ready to connect
Robust trading partner and community management
Examples: Bosch, SKF, ZF, DHL

Challenging Trading Partners:
Connectivity that does not require persistent Internet connections
Minimize security changes required of trading partners
Automated provisioning of End-Points
Support for non-standard and legacy communications
Examples: Medium sized manufacturing companies or forwarders, finance industry



Incapable Trading Partners:
Secure, controlled web-based messaging
Flexible and easy to use data transformation & validation
webEDI solutions
Examples: Emerging markets

Communications services for B2B Data Exchange (EDI)

Challenges

- Handling EDI Capable trading partners
- Handling less EDI capable trading partners
- Handling trading partners in emerging countries
- EDI support for time critical processes
- Managing a large and growing number of EDI relations and growing volumes of information, with all related parameters

Taking advantage of Internet

- Gaining bandwidth and lowering cost
- Without putting the business and it´s information at risk

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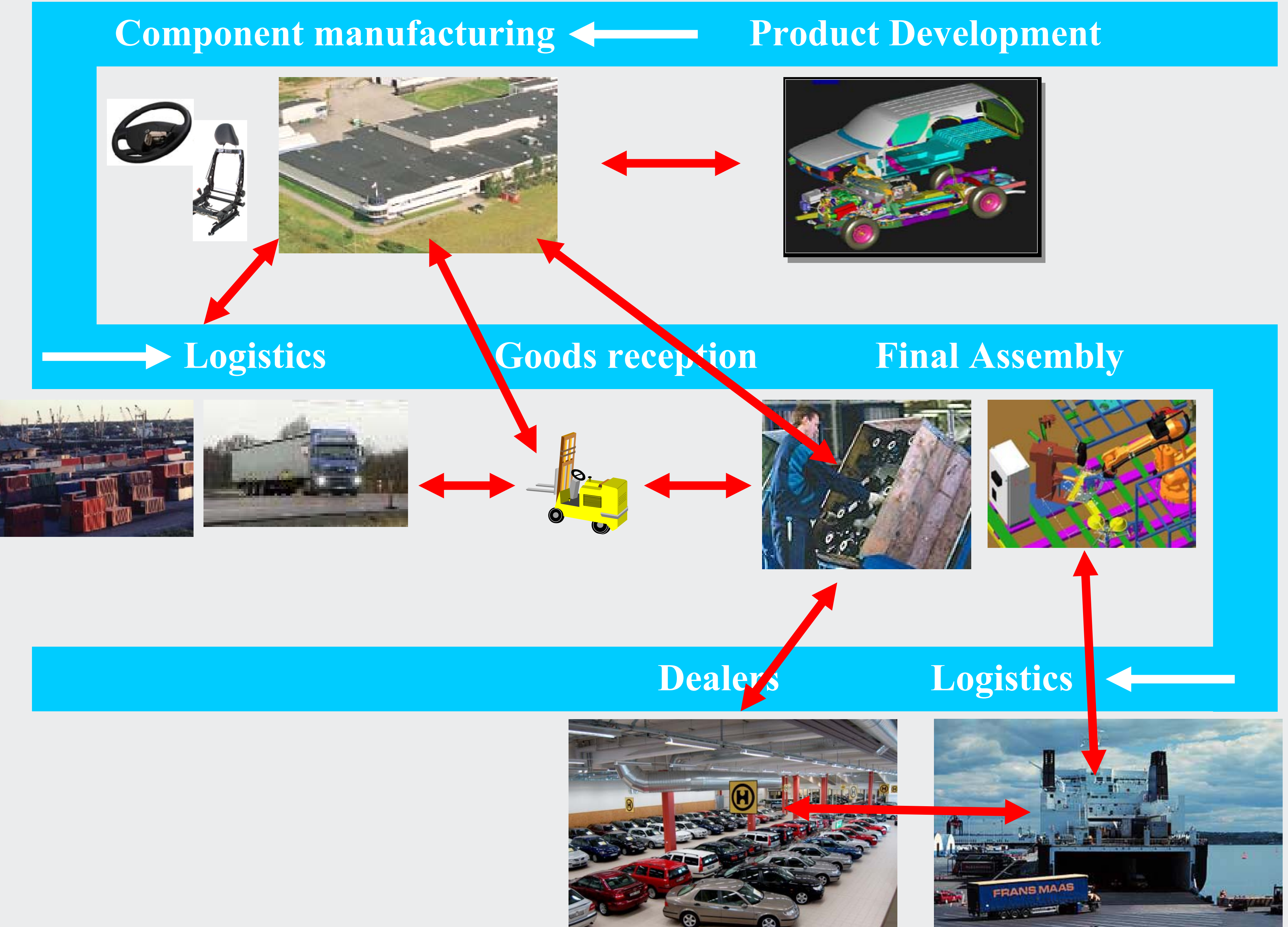
Data Exchange in the automotive industry

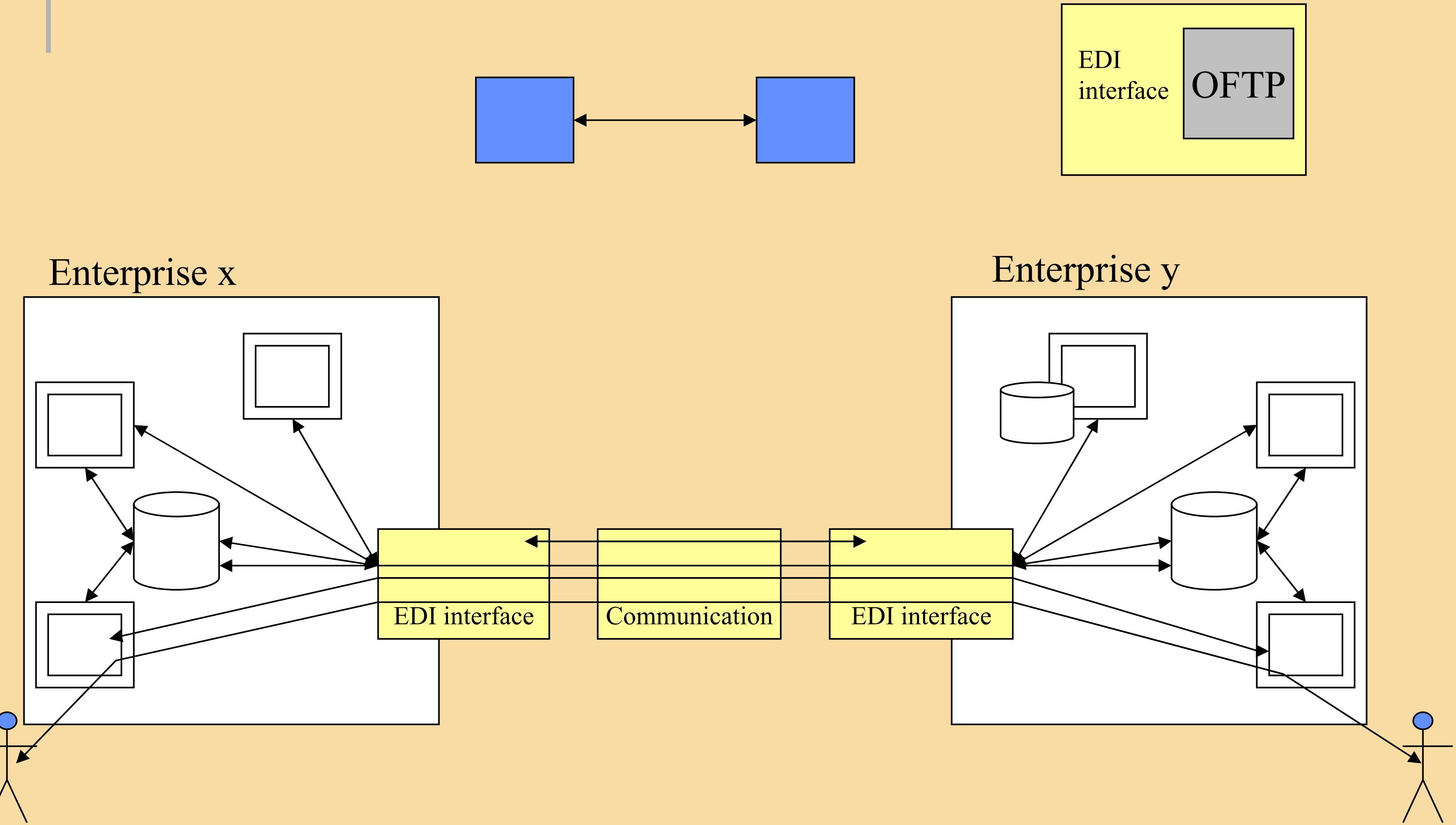


Component manufacturing ← Product Development

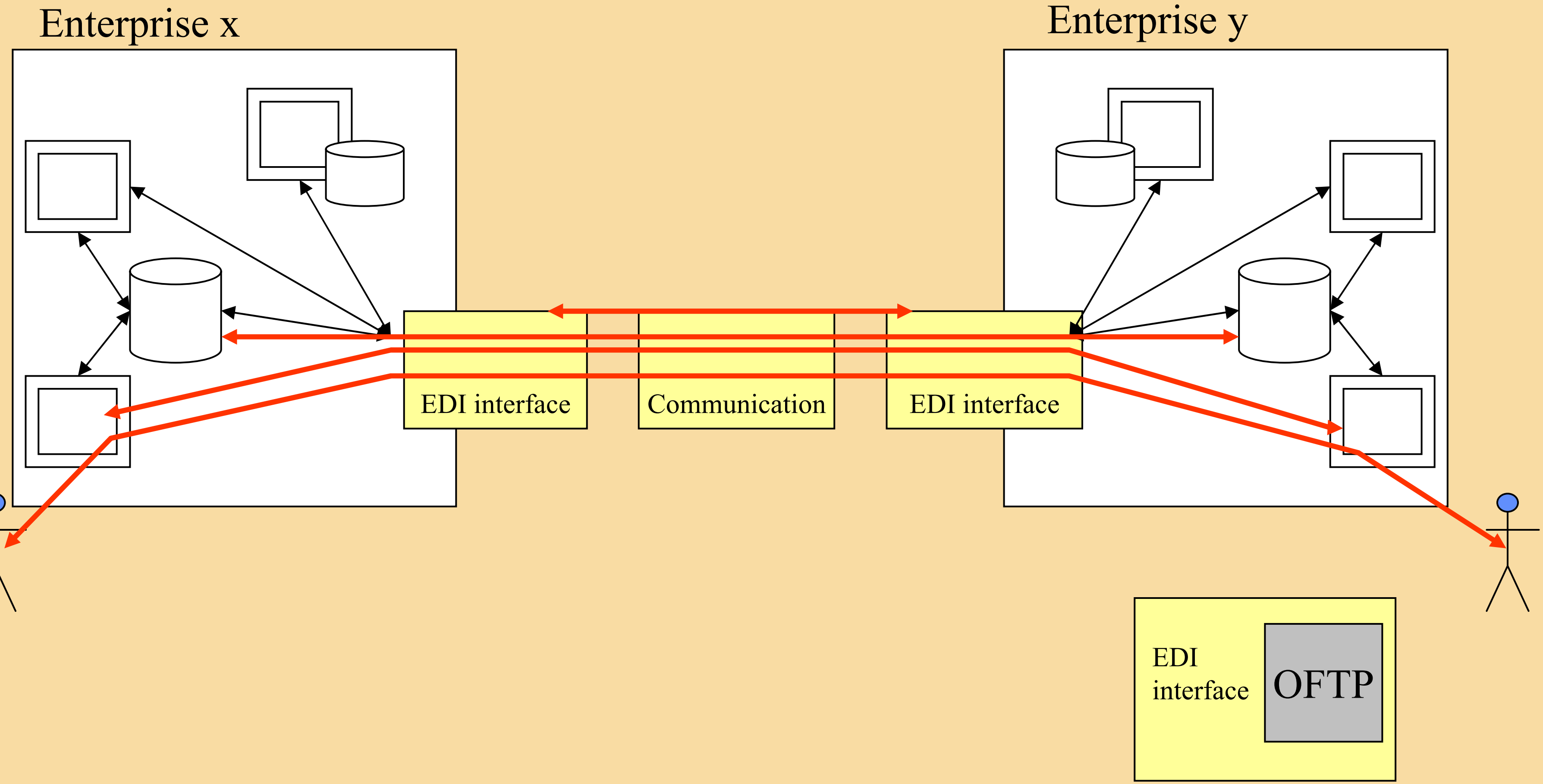
→ Logistics Goods reception Final Assembly

Dealers Logistics ←

Flow of files in B2B EDI, sketch



Flow of files in secure communication



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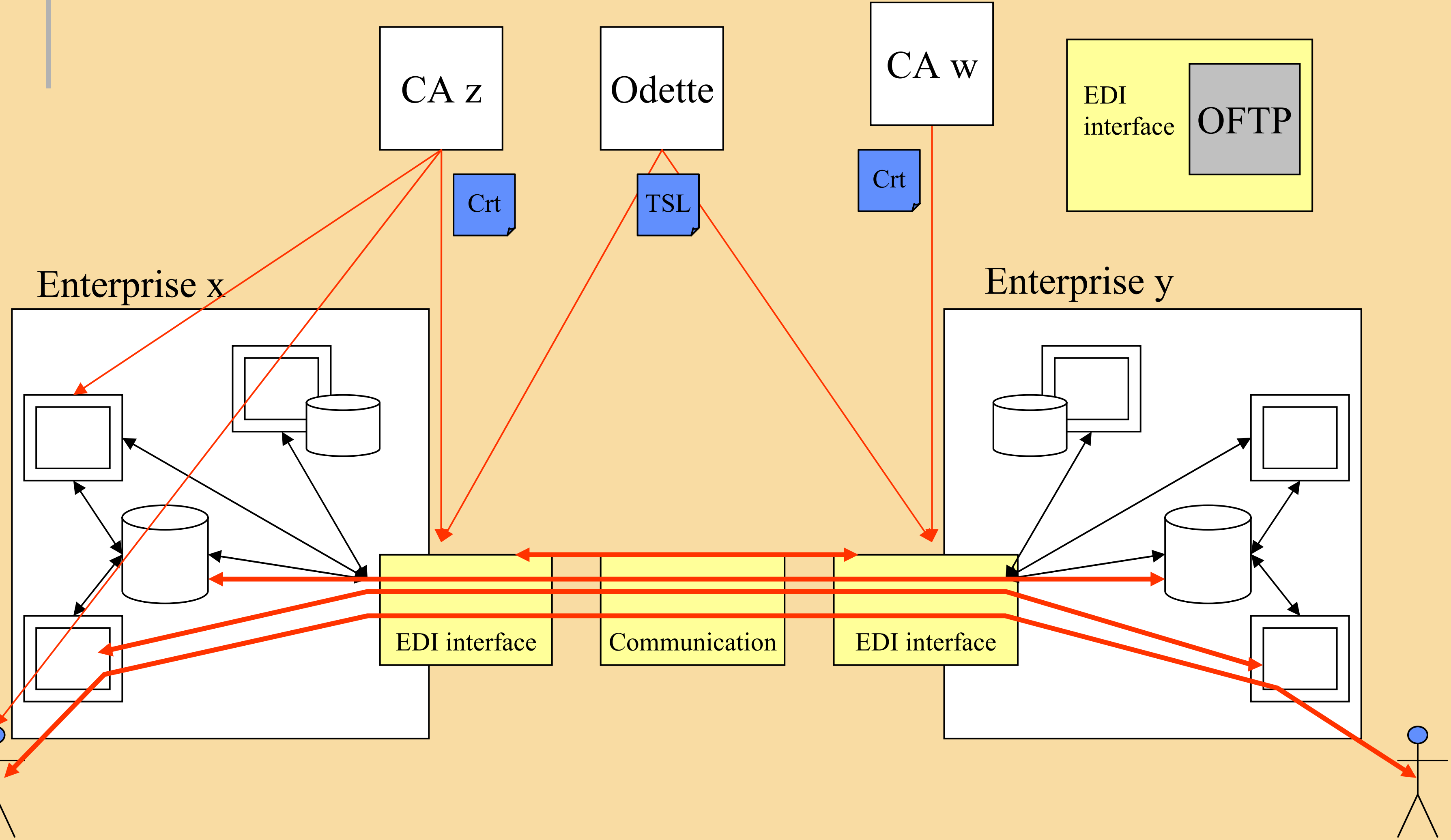
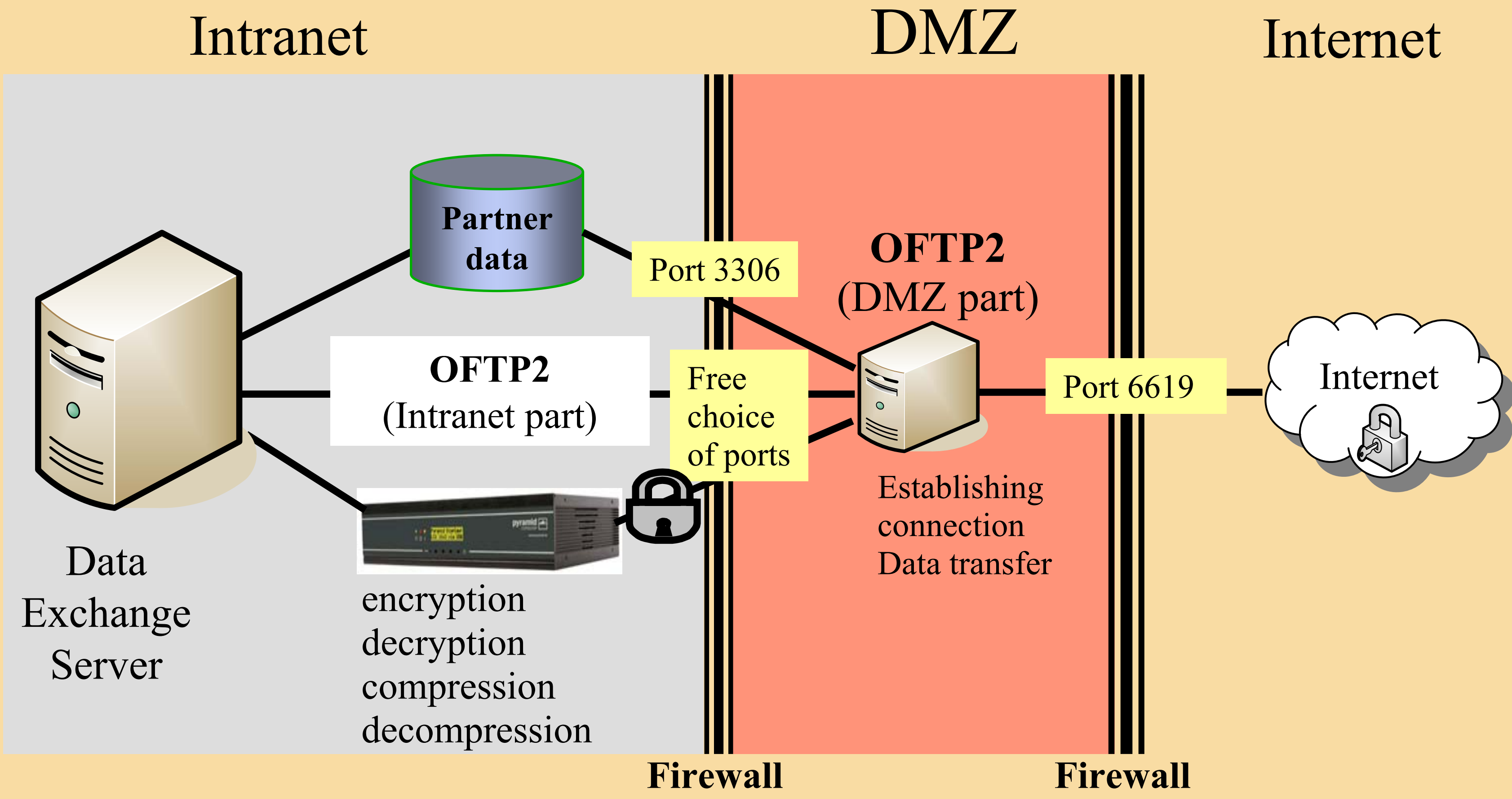
Flow of TSL, Certificates and files in secure communication



Example of secure OFTP2 configuration by Swedish OEM



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Internet som informationskanal

What is Internet?

Global Communications Network, always available

  - The Internet Backbone
  - ISP
  - Internet protocol – the basis for communications

- Examples of how the Internet is used
- Common uses
  - 4.1 E-mail
  - 4.2 The World Wide Web
  - 4.3 Remote access
  - 4.4 Collaboration
  - 4.5 File sharing
  - 4.6 Streaming media
  - 4.7 Voice telephony (VoIP)
- What are the limitations? (Nations, capacity)
  - Coverage
  - Censorship
  - other…

- Risks, threat

Internet Service Provider

Consumers obtain Internet access through an Internet Service Provider (ISP):

- capability to observe Consumer Internet activity
- restricted by legal, ethical, business and/or technical issues
- inspect for business and other purposes

Risks

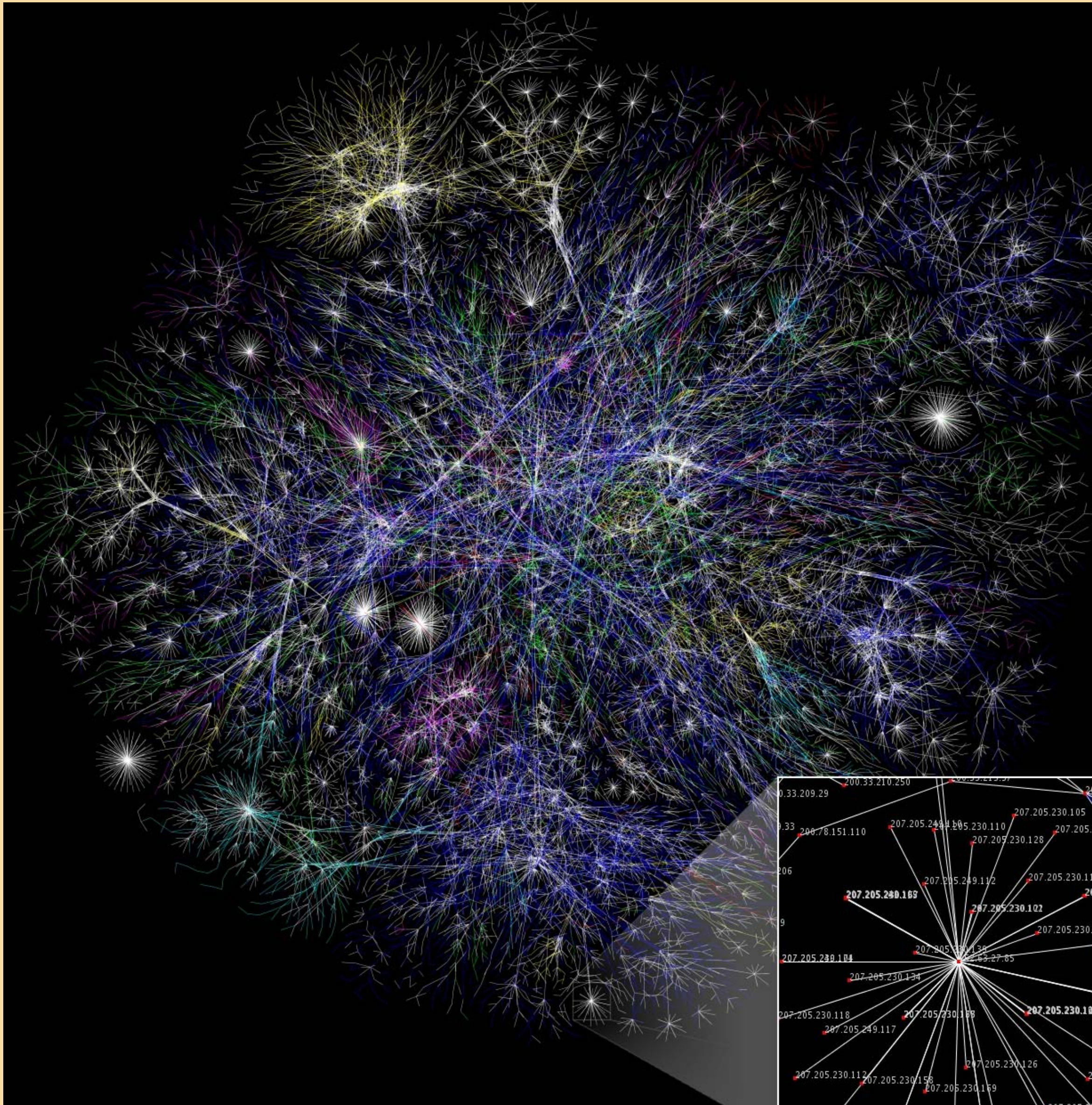
- confidentiality, other actors get access to information about your communication behavior at detailed level and/or access to your information
- Fraud, someone claim an illegitimate identity in order to get access to data and other resources
- ISP share information with other stakeholder such as authorities, communication collaboration partners, business partners…

Internet Backbone

http://en.wikipedia.org/wiki/Internet_backbone

The **Internet backbone** refers to the main "trunk" connections of the Internet. It is made up of a large collection of interconnected commercial, government, academic and other high-capacity data routes and core routers that carry data across the countries, continents and oceans of the world.

The resilience of the Internet is due to its core architectural feature of storing as little as possible network state in the network elements and rather relying on the endpoints of communication to handle most of the processing to ensure data integrity, reliability, and authentication. In addition, the high level of redundancy of today's network links and sophisticated real-time routing protocols provide alternate paths of communications for load balancing and congestion avoidance.



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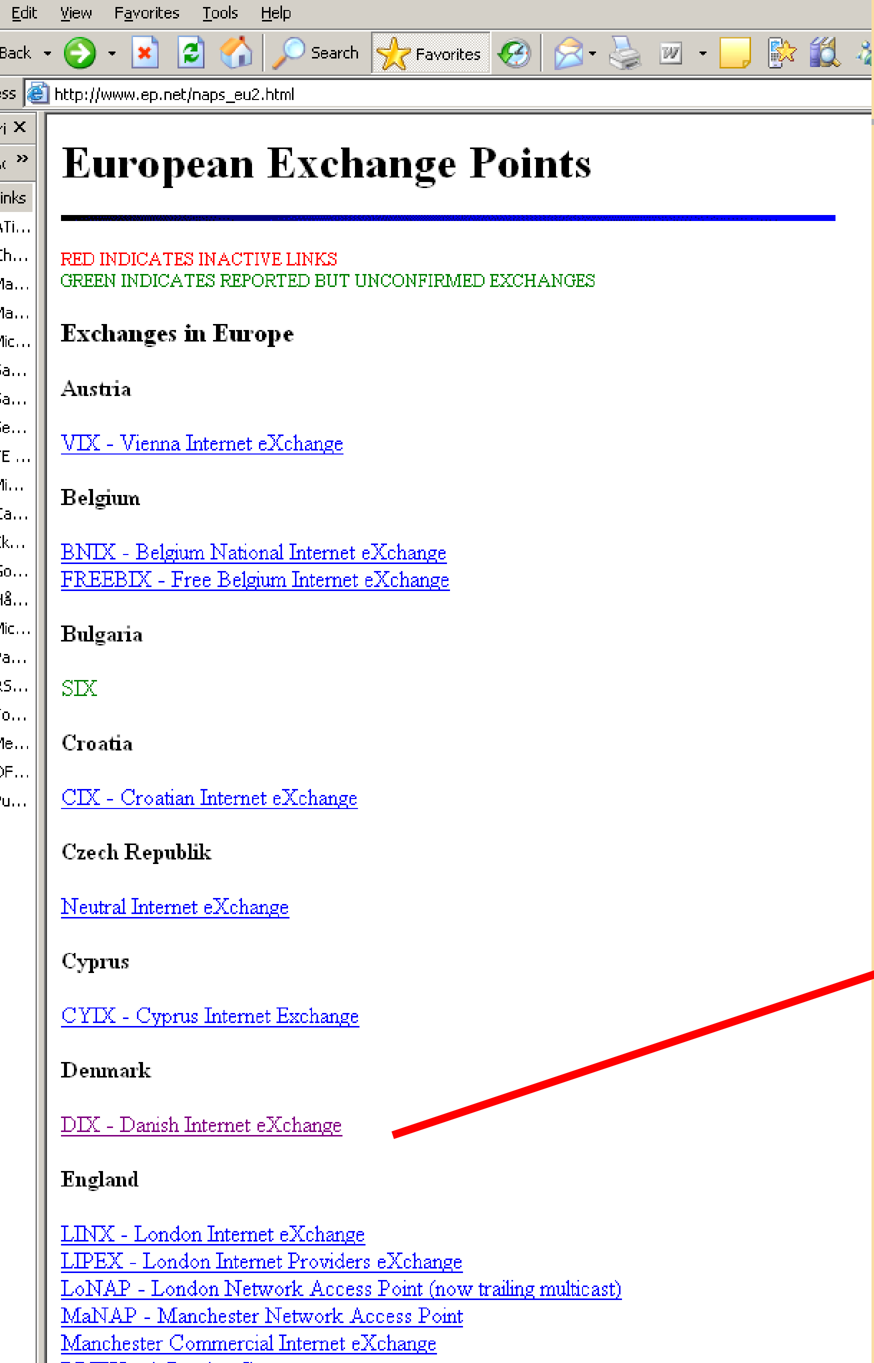
http://www.ep.net/naps_eu2.html



European Exchange Points

RED INDICATES INACTIVE LINKS
GREEN INDICATES REPORTED BUT UNCONFIRMED EXCHANGES

Exchanges in Europe

Austria

VIX - Vienna Internet eXchange

Belgium

BNIX - Belgium National Internet eXchange
FREEBIX - Free Belgium Internet eXchange

Bulgaria

SIX

Croatia

CIX - Croatian Internet eXchange

Czech Republik

Neutral Internet eXchange

Cyprus

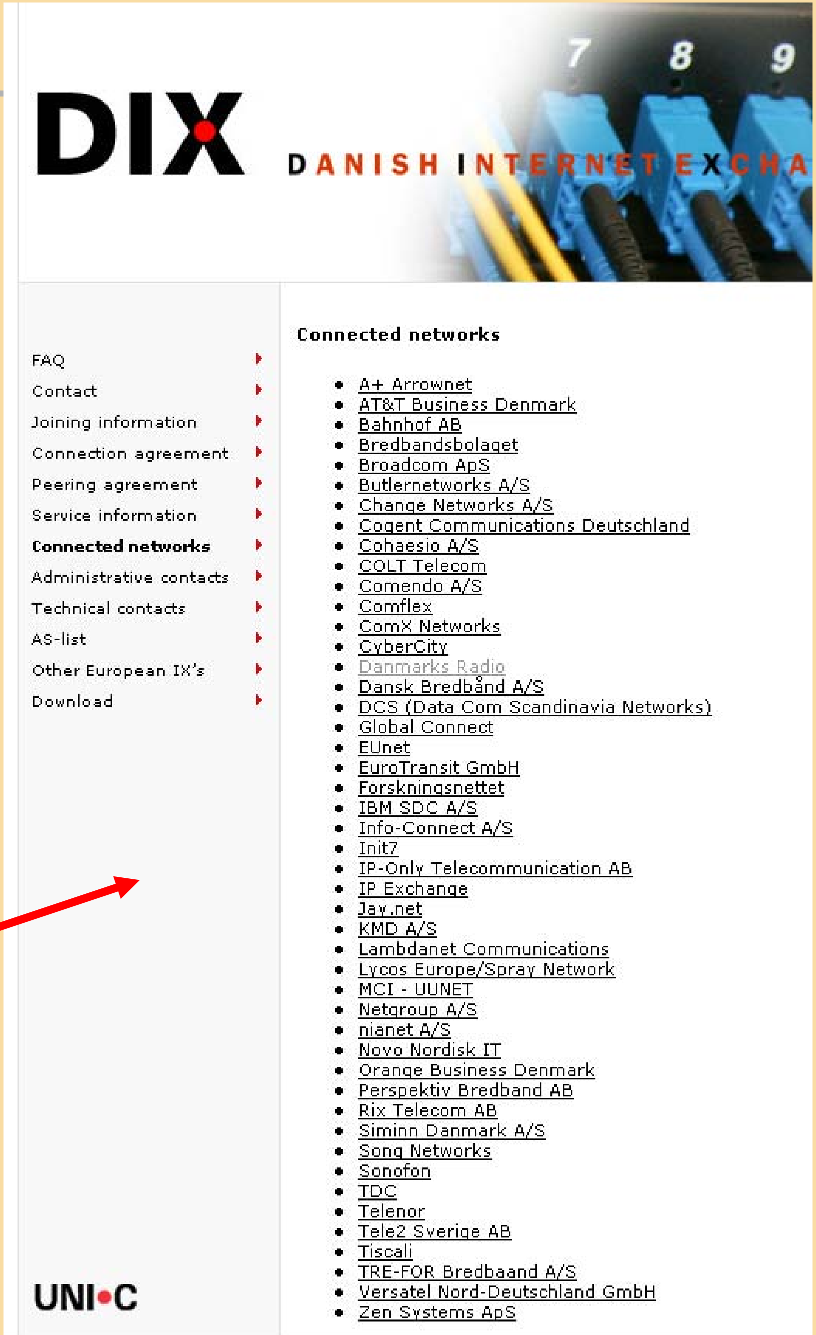
CYIX - Cyprus Internet Exchange

Denmark

DIX - Danish Internet eXchange

England

LINX - London Internet eXchange
LIPEX - London Internet Providers eXchange
LoNAP - London Network Access Point (now trailing multicast)
MaNAP - Manchester Network Access Point
Manchester Commercial Internet eXchange

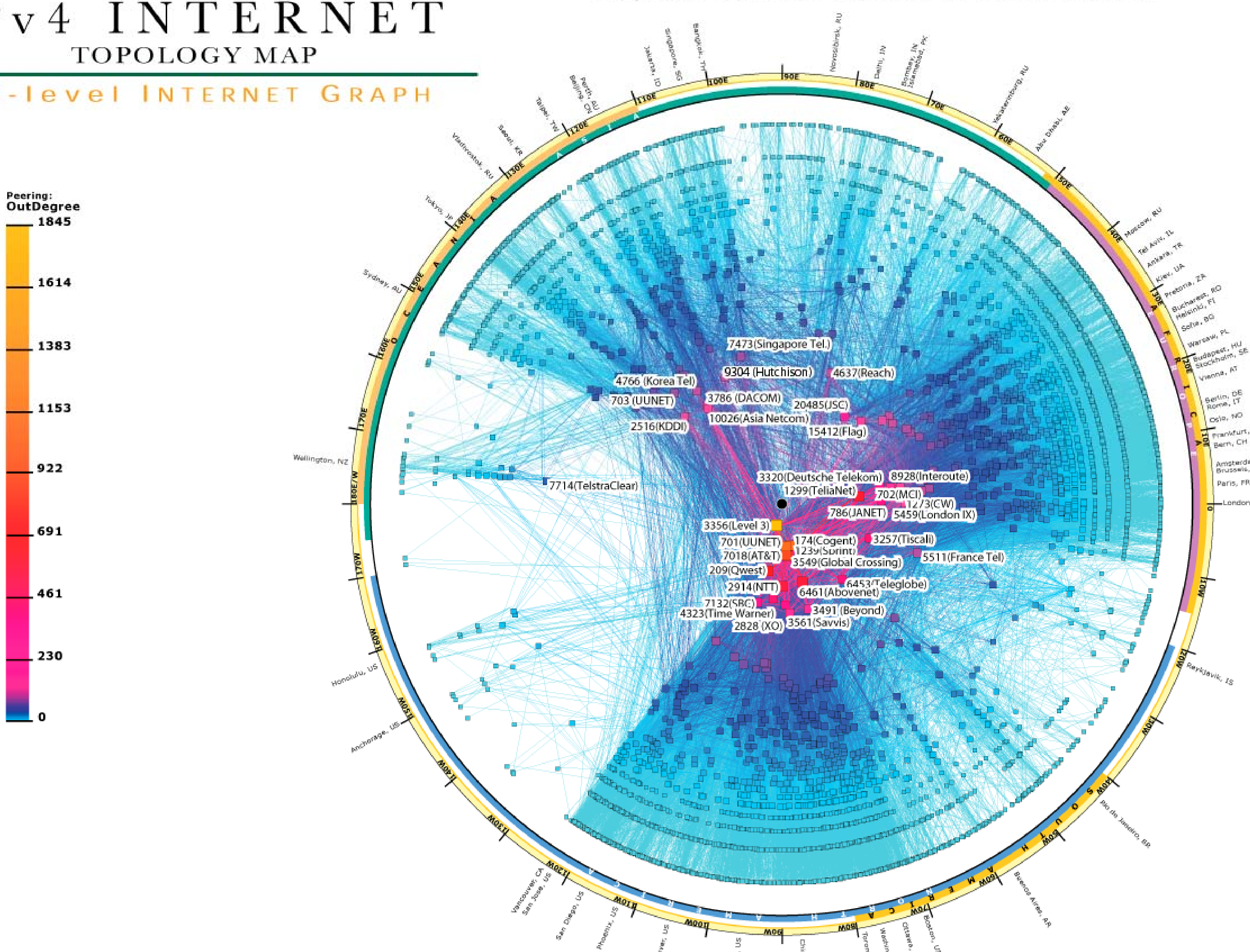


Connected networks

- A+ Arrownet
- AT&T Business Denmark
- Bahnhof AB
- Bredbandsbolaget
- Broadcom ApS
- Butlernetworks A/S
- Change Networks A/S
- Cogent Communications Deutschland
- Cohaesio A/S
- COLT Telecom
- Comendo A/S
- Comflex
- ComX Networks
- CyberCity
- Danmarks Radio
- Dansk Bredbånd A/S
- DCS (Data Com Scandinavia Networks)
- Global Connect
- EUnet
- EuroTransit GmbH
- Forskningsnettet
- IBM SDC A/S
- Info-Connect A/S
- Init7
- IP-Only Telecommunication AB
- IP Exchange
- Jay.net
- KMD A/S
- Lambdanet Communications
- Lycos Europe/Spray Network
- MCI - UUNET
- Netgroup A/S
- nianet A/S
- Novo Nordisk IT
- Orange Business Denmark
- Perspektiv Bredband AB
- Rix Telecom AB
- Siminn Danmark A/S
- Song Networks
- Sonofon
- TDC
- Telenor
- Tele2 Sverige AB
- Tiscali
- TRE-FOR Bredbaand A/S
- Versatel Nord-Deutschland GmbH
- Zen Systems ApS

IPv4 INTERNET
TOPOLOGY MAP

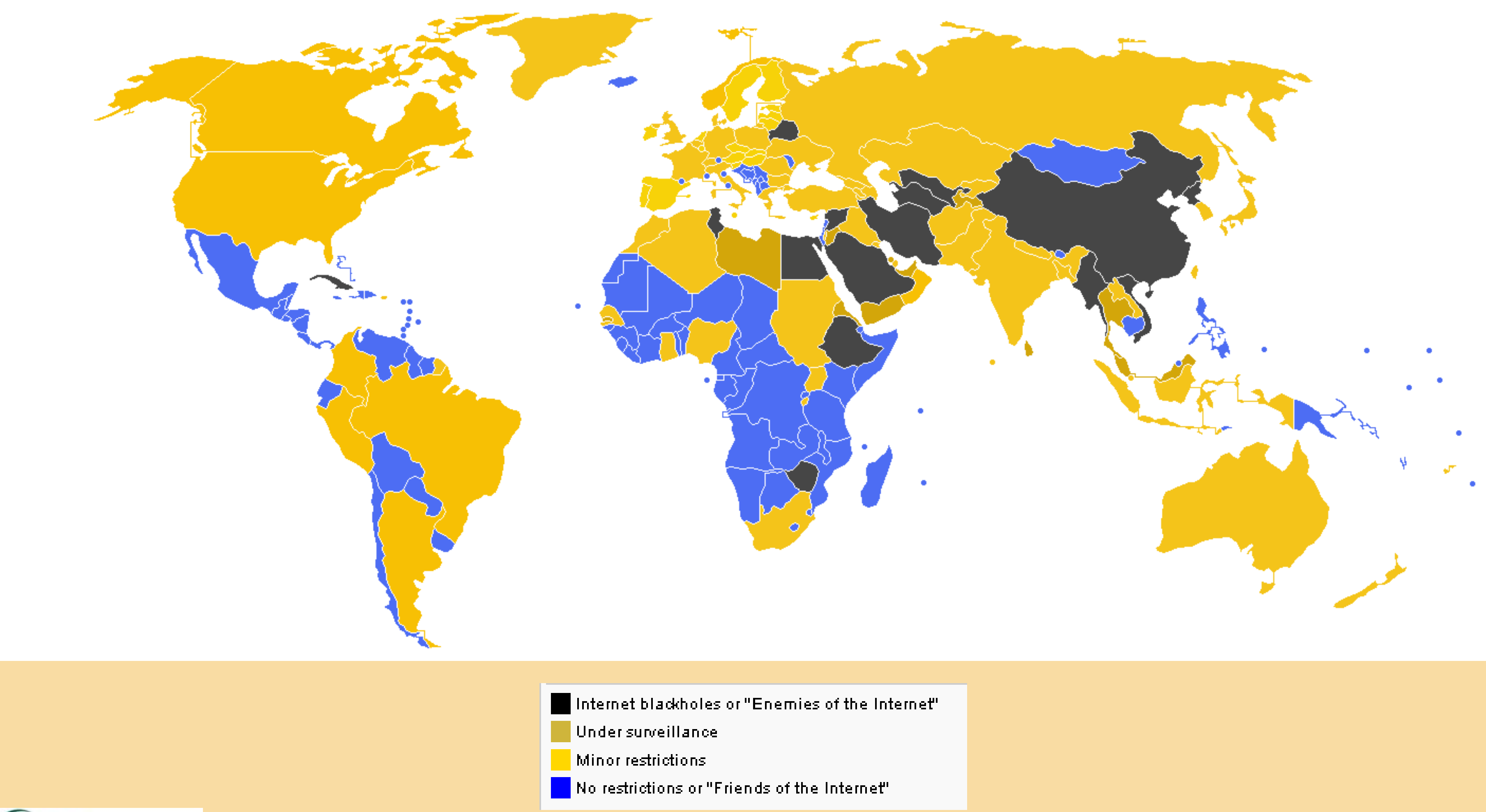
AS-level INTERNET GRAPH



http://www.caida.org/research/topology/as_core_network/

Internet censorship

December 2008


⬛ Internet blackholes or "Enemies of the Internet"
▨ Under surveillance
🟨 Minor restrictions
🟦 No restrictions or "Friends of the Internet"

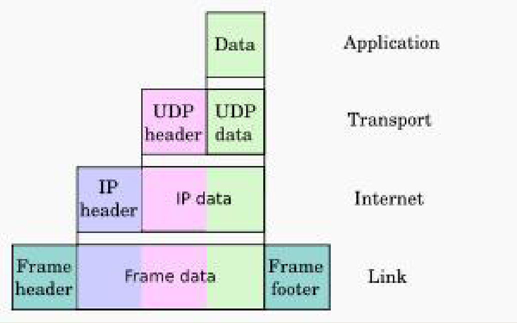
http://en.wikipedia.org/wiki/Internet_censorship

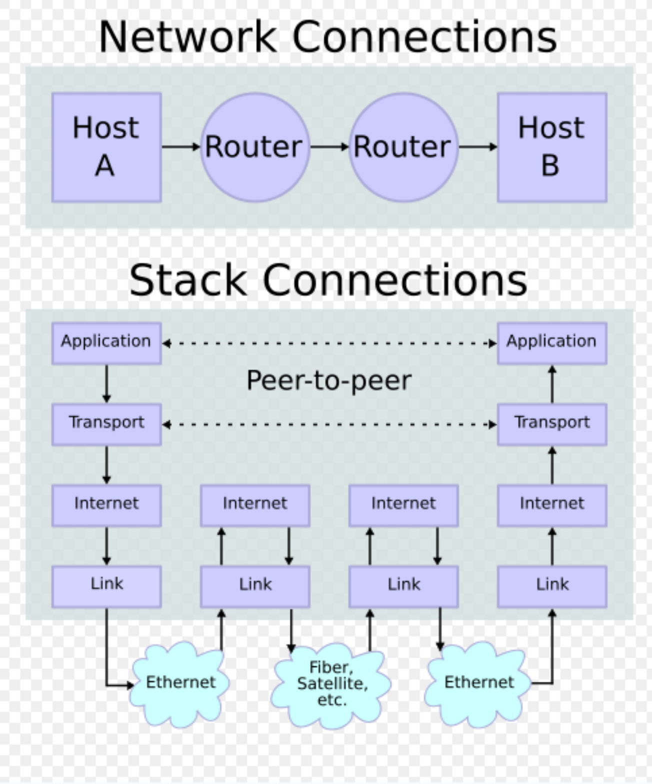
Internet stack and protocols

The IETF has repeatedly stated that Internet protocol and architecture development is not intended to be OSI-compliant.

Application	DNS, TFTP, TLS/SSL, FTP, Gopher, HTTP, IMAP, IRC, NNTP, POP3, SIP, SMTP, SNMP, SSH, Telnet, Echo, RTP, PNRP, rlogin, ENRP Routing protocols like BGP and RIP which run over TCP/UDP, may also be considered part of the Internet Layer.
Transport	TCP, UDP, DCCP, SCTP, IL, RUDP, RSVP
Internet	IP (IPv4, IPv6) ICMP, IGMP, and ICMPv6 OSPF for IPv4 was initially considered IP layer protocol since it runs per IP-subnet, but has been placed on the Link since RFC 2740.
Link	ARP, RARP, OSPF (IPv4/IPv6), IS-IS, NDP

Encapsulation of application data descending through the protocol stack





Issues (Challenges) (Pros and Cons) when running EDI over Internet

- Multi-purpose network
- Global coverage
- Reliability
- Security
- Cost-effectiveness

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Principerna för informationsskydd med PKI

Today's needs

- More speed, less cost and world wide
- Leave the old networks (X25, ISDN)!
- Go to TCP/IP (Internet, ENX, ...)
- Security: Authentication, Confidentialness, Integrity, Non Repudiation Mandatory over Internet
- Basic components : Keys & Certificates.

SECURITY is based on TRUST

Trust : In which Layer?

Trust at Network level:

- Private point to point links
- VPN: Based on IPSEC or SSL
- ENX: A European Automotive VPN

Trust at Software level:

- Security is inboard, in the application

Trust at Network Level

- Security targets:
  - Peer **authentication**
  - Traffic **protection** against overseer
- Advantages:
  - Application **transparency** (leased lines or IPSEC)
  - ENX: **Delegated management**
- Disadvantages:
  - ENX: **Cost** & dependency / home made **VPN**
  - Leased Lines: **Not flexible**, **Expensive** and finally not that trusty!
  - **No file services (**Does not address file content**)**

Trust at Software Level

- Security targets:
  - Peer **authentication** (not only the site, but the server)
  - Traffic **protection** against overseer
  - End to end **file services**
- Advantages:
  - Advanced **file** services features : end to end **encryption**, **signature** and **integrity**, **non repudiation**
  - **Same software**: just some configuration items more
  - **Low cost** communications (Internet)
  - **Autonomy**: no operator and even no IT team dependency
- Disadvantages:
  - Applications become more **complicated**
  - **Internet** connection must be **seriously secured** (DMZ, **Relays**…)

PKI and security issues

PKI and the handling of certificates

Four basic aspects of security:

- **Integrity** which guarantees that data was not altered during transmission.
- **Authenticity** which verifies the identities of the parties involved in an electronic transmission.
- **Non-repudiation** of origin which ensures that no party involved in an electronic transaction can deny their involvement in the transaction.
- **Confidentiality** that ensures that only those who are entitled can access the transmitted data

Public Key Crypto Systems

- Public and private keys
- Speed
- Attacks
- Key length

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Public and private key

Symmetric crypto - encrypt and decrypt with same crypto key

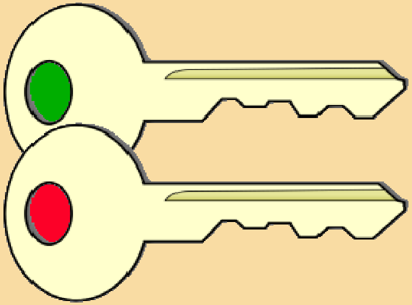
Asymmetric crypto – two different but interdependent keys, encrypt with one and decrypt with the other one, and vice versa

Using Asymmetric crypto for Public and Private Key

- Receive Public Key encrypted messages from many
- Distribute Private Key encrypted messages to many

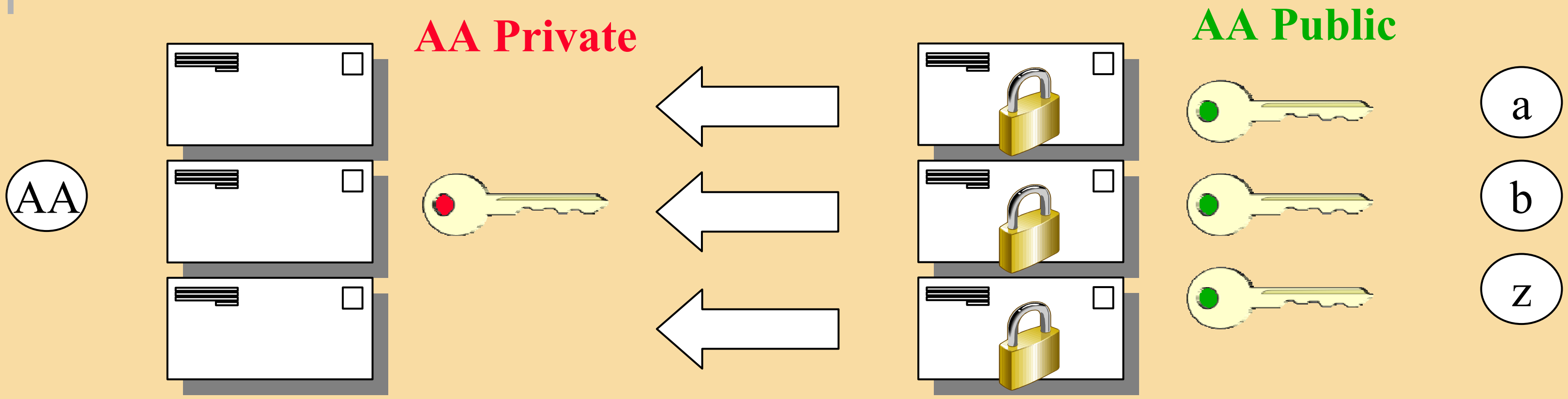
Using Private and Public Key

- Signing
- Protection
- Identification

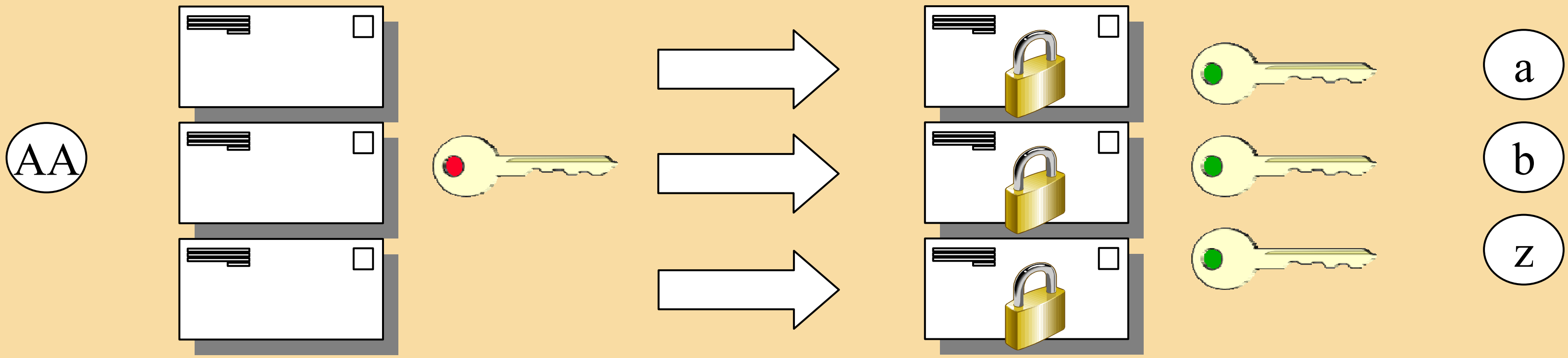


Private and Public key usage, illustration

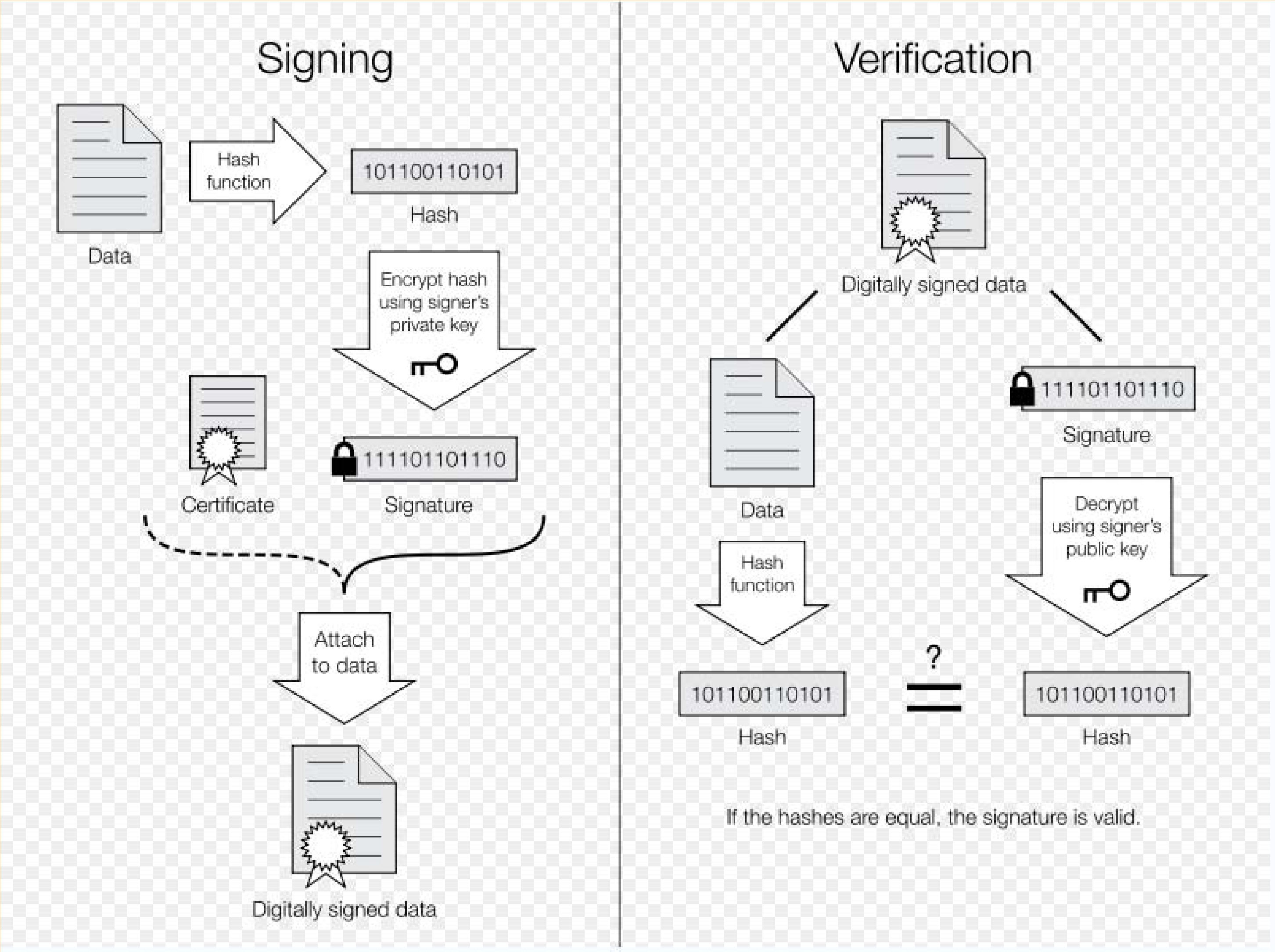
Message to AA encrypted with AA public key



Message from AA encrypted with AA private key

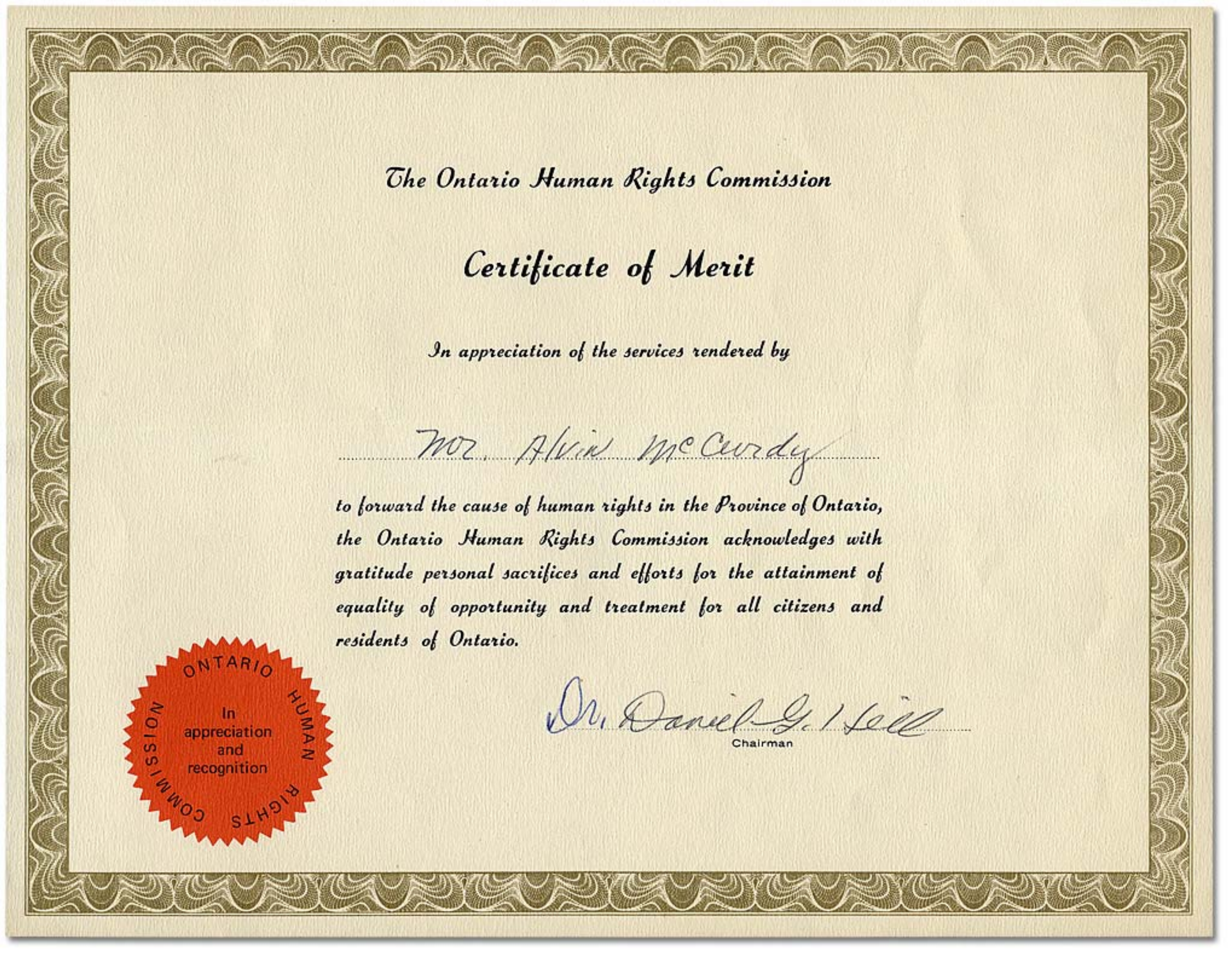


Digital signature, example



http://en.wikipedia.org/wiki/File:Digital_Signature_diagram.svg

Certificates



The Ontario Human Rights Commission

Certificate of Merit

In appreciation of the services rendered by

Mr. Alvin McCurdy

to forward the cause of human rights in the Province of Ontario, the Ontario Human Rights Commission acknowledges with gratitude personal sacrifices and efforts for the attainment of equality of opportunity and treatment for all citizens and residents of Ontario.

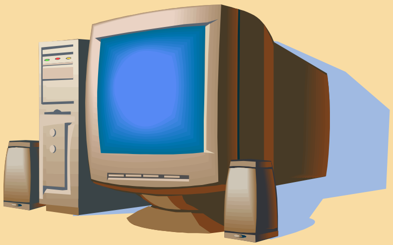
ONTARIO HUMAN RIGHTS COMMISSION

In appreciation and recognition

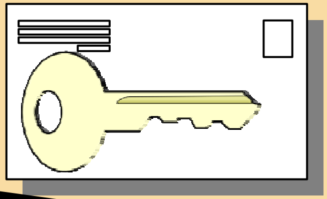
Dr. Daniel G. Hill

Chairman

Certificate Authorities



Certificate Signing Request



User sends public key and identifying information

CA creates certificate and signs with CA's private key

The Ontario Human Rights Commission

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ONTARIO HUMAN RIGHTS COMMISSION

In appreciation and recognition

Dr. Daniel G. Hill

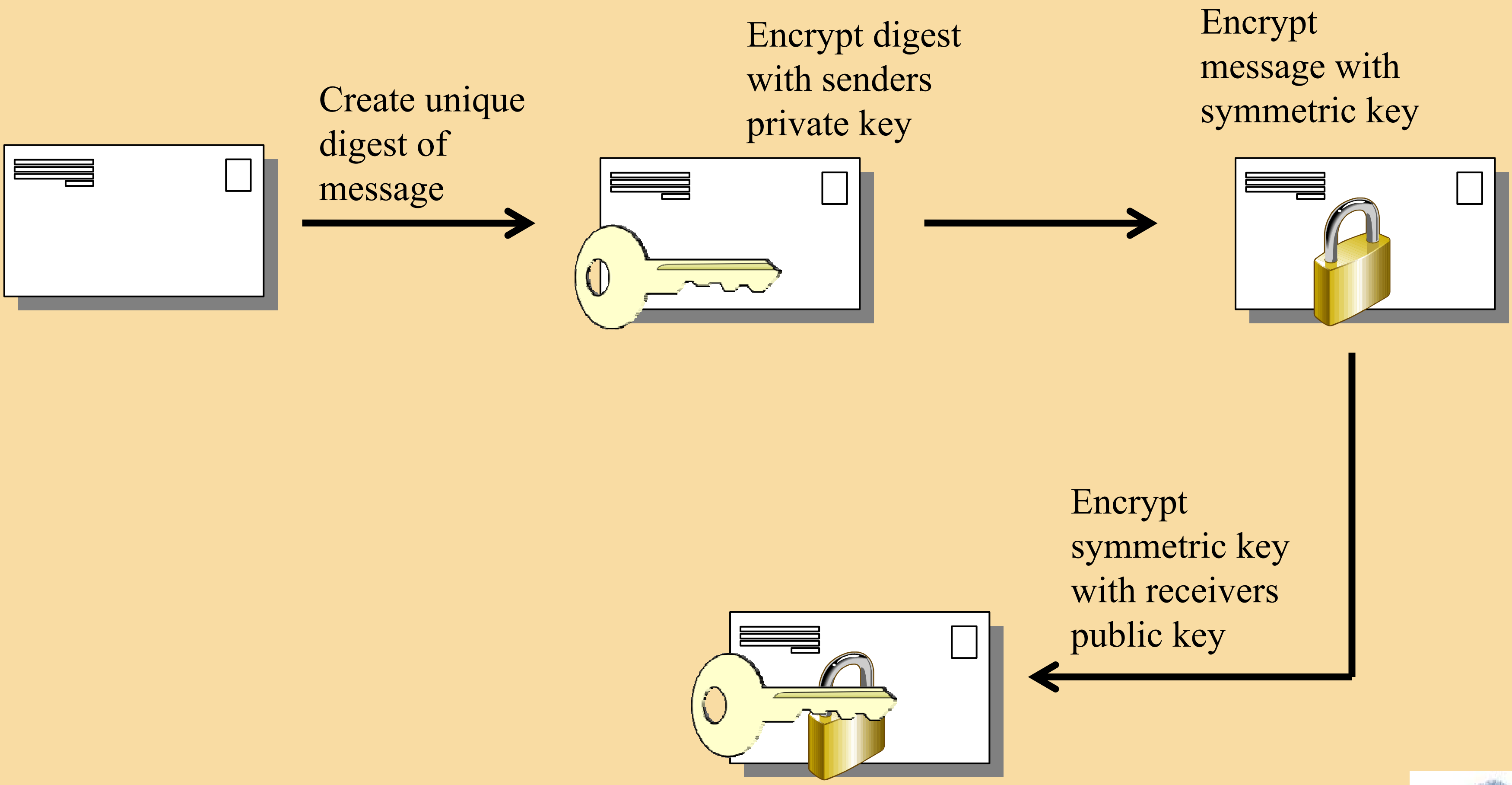
An X.509 certificate typically contains:

- Version
- Serial Number
- Signature
- Issuer name
- the validity time window
- a subject containing the owners identifying details

Digital Signatures

- Integrity
- Authenticity
- Non-repudiation of origin

Signing and Sending



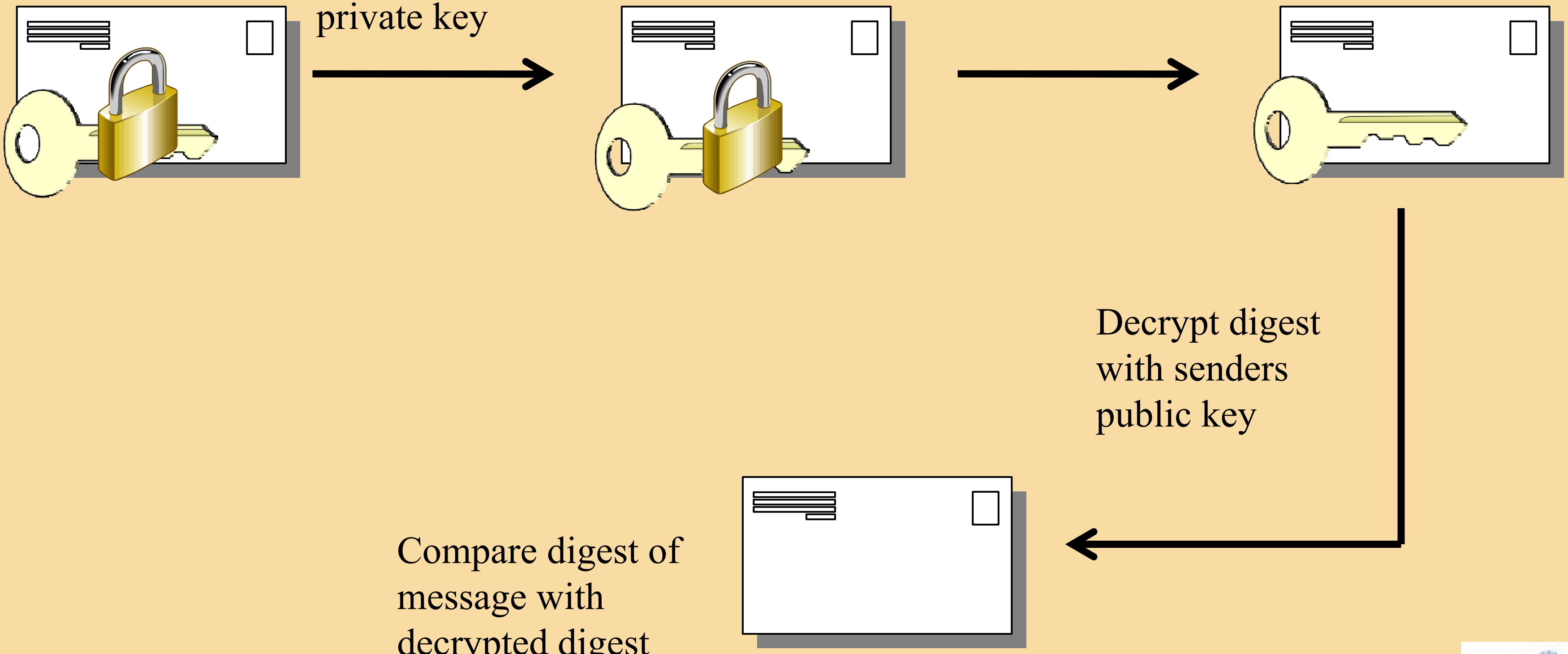
Create unique digest of message

Encrypt digest with senders private key

Encrypt message with symmetric key

Encrypt symmetric key with receivers public key

Decrypting and Verifying



Decrypt symmetric key with receivers private key

Decrypt message with symmetric key

Decrypt digest with senders public key

Compare digest of message with decrypted digest

Secure Communications

Odette File Transfer Protocol Version 2

- Session security
- Secure authentication
- File encryption
- File signing

Security in use

Reduce costs!

- Low cost global network
- Secure use of Internet
- OFTP2

Administration of Security Certificates

The Odette SCX Project

- Targets:
  - Allow the **automatic** exchange and management of certificates,
  - Use **industry standards**
  - Find a solution which can be **implemented quickly and is reliable** to facilitate introduction of **OFTP2**

Managing Security following the Odette SCX Recommendation

- Security Certificate Exchange (SCX) Recommendation has been released in 2008
- Security certificates provide proof of identity of the partners, allow encryption / decryption / integrity-check of files and ensure non-repudiation of the data exchange.
- A Trust Service Status Lists (TSL) has been established by Odette
- Odette is the trust guardian and provides this service to the automotive industry community
- TSL contains details of the trustable Security Certificate providers (CAs)
- TSL is being published and updated on Internet and can be accessed by OFTP2 software easily

OFTP2 Certificate Policy Version 1.0

Certificate Usage:

OFTP2 application usage for encryption, authentication and integrity.

Certificate Requirements:

Types of certificates

- TLS:
  - One for session authentication and encryption ,
- OFTP protocol:
  - One for OFTP authentication (challenge encryption),
  - One for EERP signing,
- File security service (CMS):
  - One for file signature,
  - One for file encryption.

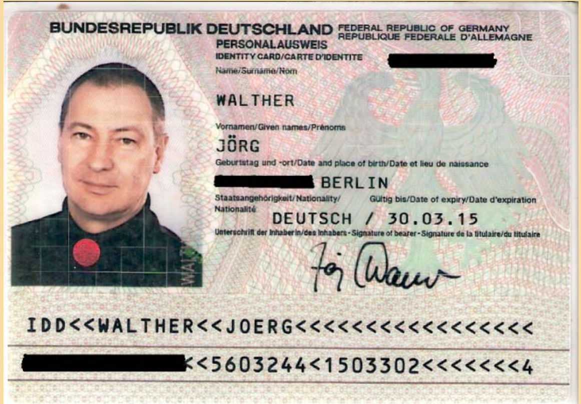
Large scale deployment of certificates

- Several applications
  - **OFTP2**, e-mail, File encryption and signature, secure access to web server, AS2…
- All of them use **certificates**
- **Hundreds** of partners' certificates
- Signed by **dozends of CAs**

- **A mess of various CAs and certificate in use**

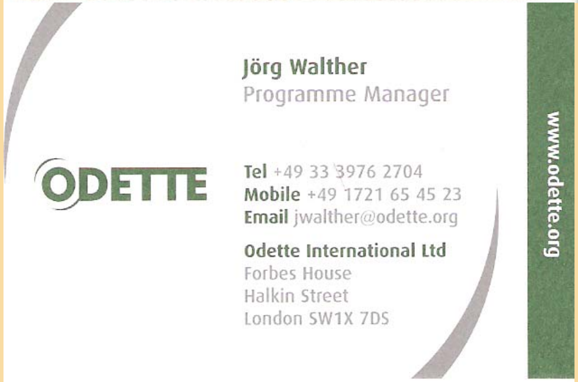
The Challenge of Trust

- Technically, (nearly) all certificates implement the same standard technology
- Whether you trust them, depends on the issuing CA and how trustable the CA is
- With hundrets of CA's the assessment of trustability of each of them becomes a nightmare



BUNDESREPUBLIK DEUTSCHLAND FEDERAL REPUBLIC OF GERMANY REPUBLIQUE FEDERALE D'ALLEMAGNE
PERSONALAUSWEIS
IDENTITY CARD/CARTE D'IDENTITE [redacted]
Name/Surname/Nom
WALTHER
Vornamen/Given names/Prénoms
JÖRG
Geburtstag und -ort/Date and place of birth/Date et lieu de naissance
[redacted] BERLIN
Staatsangehörigkeit/Nationality/Nationalité Gültig bis/Date of expiry/Date d'expiration
DEUTSCH / 30.03.15
Unterschrift der Inhaberin/des Inhabers - Signature of bearer - Signature de la titulaire/du titulaire

IDD<<WALTHER<<JOERG<<<<<<<<<<<<<<<<<
[redacted]<<5603244<1503302<<<<<<<4



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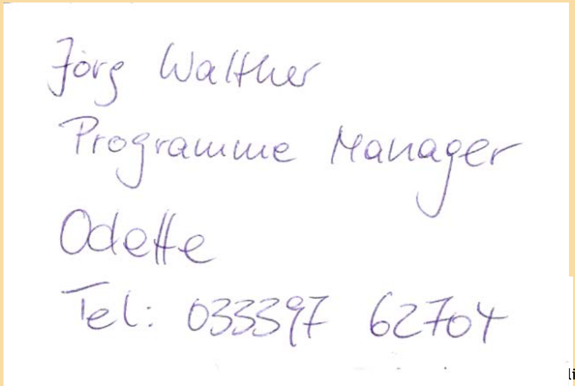

Jörg Walther
Programme Manager
Odette
Tel: 033397 62704

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The Odette SCX recommendation

- Mainly 3 alternative solutions to choose from:
  - Use a Bridge CA (one agreement with Bridge CA connects you to all others having agreement with the Bridge CA)
  - ***Implement a TSL under the authority of some organisation,***
  - Accept only one CA

The second option has been chosen, with Odette as the responsible organisation

The Odette SCX recommendation

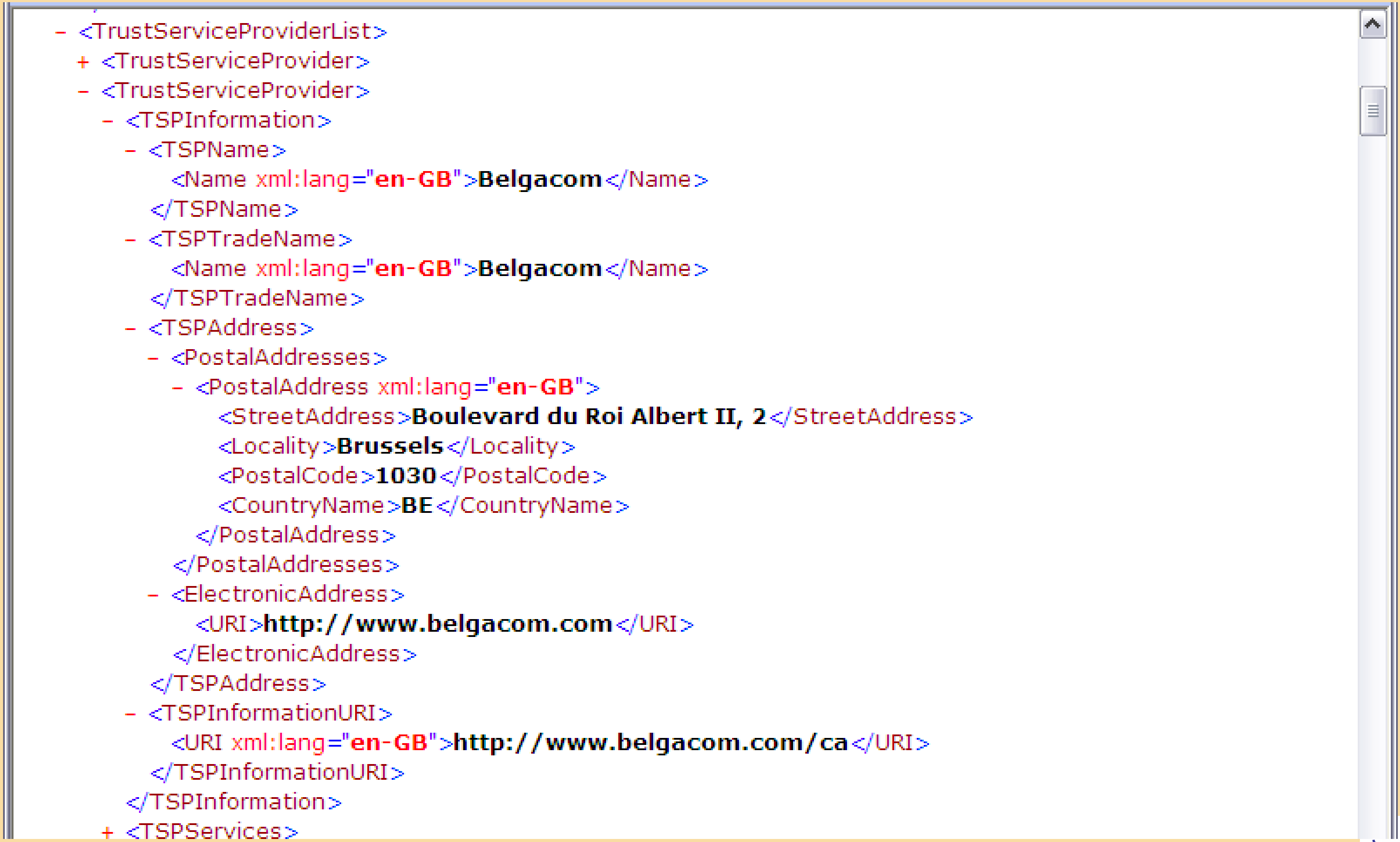
What’s a TSL?

Trust Service Status List

- An ETSI standard using XML syntax
- Contains the list of the issuing CAs and their certificates, which are recognised as “trustable”, according to an agreed policy.
- The list is signed by a trusted authority (Odette)
- This list is used by the software to trust or reject automatically CA signed certificates

Several lists for different applications will be managed by Odette

TSL Snippet

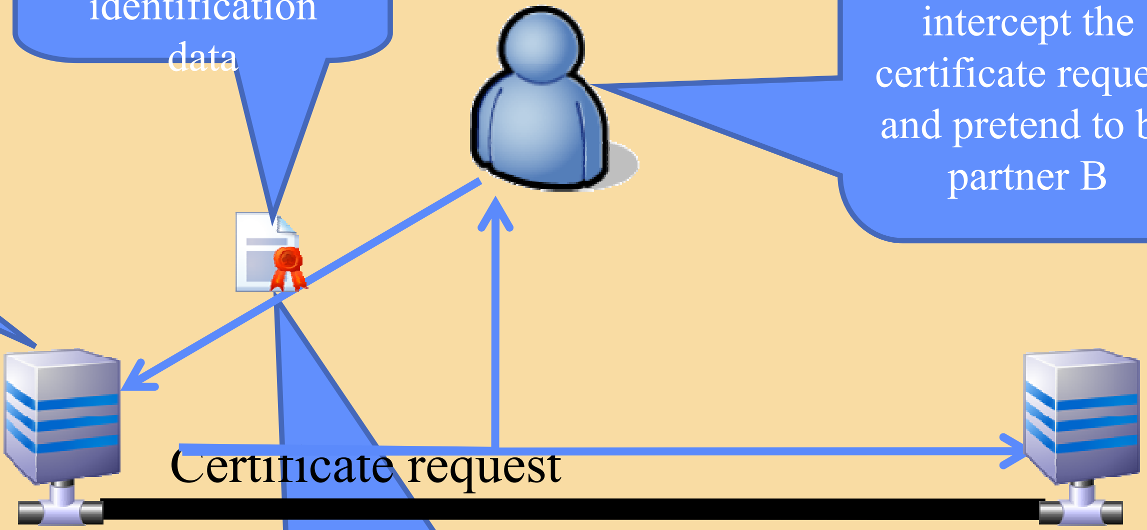


```
- <TrustServiceProviderList>
  + <TrustServiceProvider>
  - <TrustServiceProvider>
    - <TSPInformation>
      - <TSPName>
          <Name xml:lang="en-GB">Belgacom</Name>
        </TSPName>
      - <TSPTradeName>
          <Name xml:lang="en-GB">Belgacom</Name>
        </TSPTradeName>
      - <TSPAddress>
        - <PostalAddresses>
          - <PostalAddress xml:lang="en-GB">
              <StreetAddress>Boulevard du Roi Albert II, 2</StreetAddress>
              <Locality>Brussels</Locality>
              <PostalCode>1030</PostalCode>
              <CountryName>BE</CountryName>
            </PostalAddress>
          </PostalAddresses>
        - <ElectronicAddress>
            <URI>http://www.belgacom.com</URI>
          </ElectronicAddress>
        </TSPAddress>
      - <TSPInformationURI>
          <URI xml:lang="en-GB">http://www.belgacom.com/ca</URI>
        </TSPInformationURI>
      </TSPInformation>
    + <TSPServices>
```

Current Types of Trust Service-status Lists (TSL)

- BASIC
  - Odette performs an identity check of the CA owner for all CAs on TSL Basic .
- OFTP2
  - Additional restrictions apply: only CAs that isuue certificates usable for OFTP2 data exchange are listed (i.e. they comply to a certificate policy)
  - Pre-requisit: CAs must be registered on TSL Basic

TSL helps to prevent Man-in-the-middle Attacks



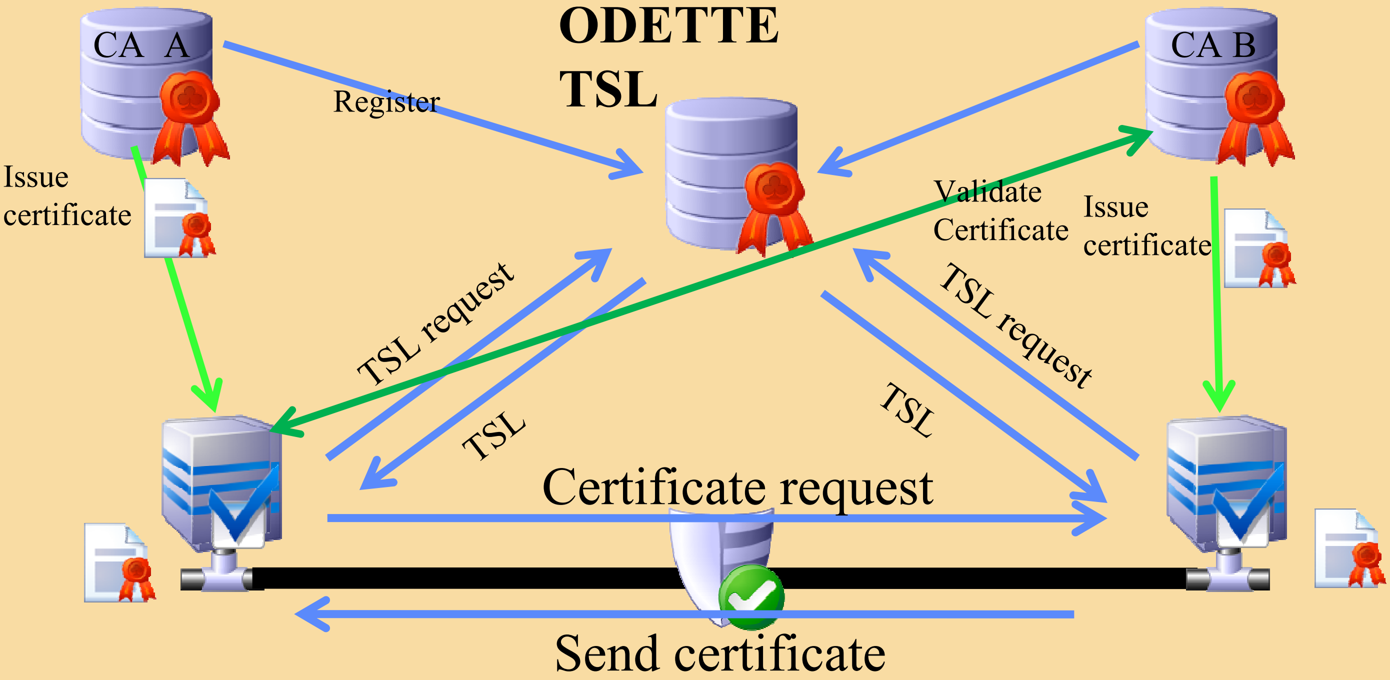
The initial certificate exchange is critical

This certificate contains false identification data

A man in the middle could intercept the certificate request and pretend to be partner B

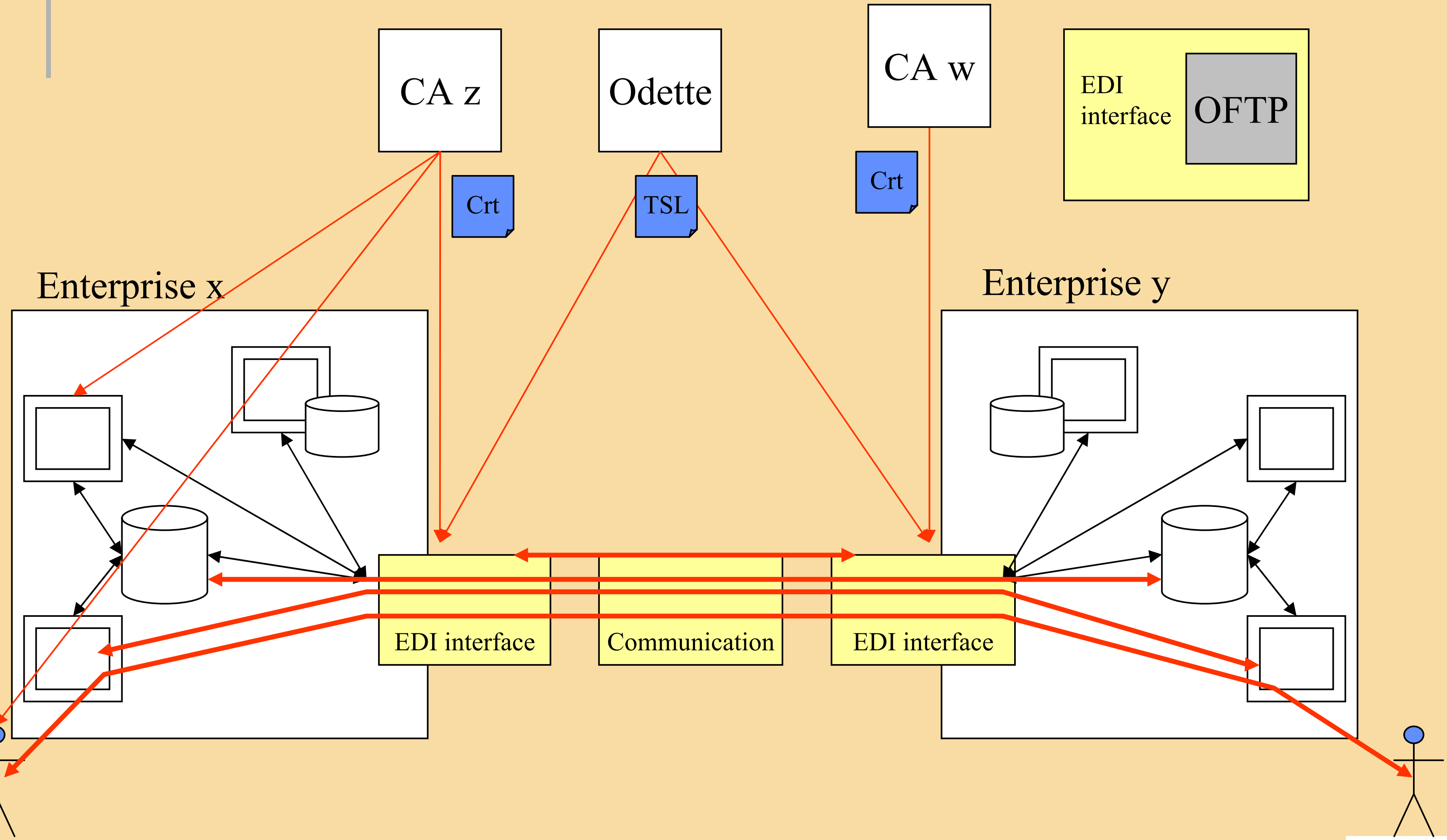
That‘s why it is important to accept only certificates of trustable CAs : they will not sign / issue certificates with wrong identification data!

Odette – **T**rust **S**tatus Service **L**ist –TSL Administration



Finally – a secure, trusted connection!

Flow of TSL, Certificates and files in secure communication



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i Försörjningskedjan

The role of Odette

- Distribute the certificate policy associated with the TSL to CA:s organisations
- Collect their commitment
- Build the TSL with the certificates of those who accept the policy
- Verification:
  - The commitment of a CA is made on a volunteer basis, by self-assessment
  - If a CA's policy becomes incompatible with the TSL policy, this CA will finally be discarded.

SCX Implementation

- The work to build the TSLs is carried out by Odette CO supervised by a permanent Odette committee
- TSLs and their associated policies are published on the Odette Web site **http://www.odette.org/tsl/pol_basic.txt** **http://www.odette.org/tsl/pol_oftp2.txt**
- Enabled software will download it according to a special policy in order to avoid bottleneck
- The software will be able to automatically trust or distrust a certificate, basing its decision on the trusted CA list
- **OFTP2** will be the first application which will benefit of these features
- Other applications will have their own TSL according to their own need in mater of certificate policy (e.g. secure email).

OFTP2 documents review - SCX recommendations

Prerequisites to add a CA to the ODETTE TSL

- Odette must check that the CA exists as a legal entity – e.g. by requiring a copy of the company registration form
- A responsible person of that company must sign a document stating that she/he is responsible for the PKI of that company or branch
- The PKI system belongs to the identified legal entity
- The company adheres to the requirements stated in the policy document
- The company accepts the terms and conditions of the TSL service provided by Odette International

Terms & Conditions exclude claims and warranties for ODETTE and the CA

How to get security certificates for OFTP2

- Security Certificates for OFTP2 must come from CAs listed on the Odette TSL (**T**rust **S**ervice **S**tatus **L**ists)
- Therefore the first step is to check this list
- The second step is to see if your company already has obtained certificates that could be used also for OFTP2 (beside other use such as secure websites)
- If you have a preferred CA services provider which is not listed on the Odette TSL you can suggest your CA to apply for being listed
- Another potential providers of security certificates is the Odette CA, or possibly your OFTP2 software provider or a major customer (OEM)

Status of OFTP2 implementation in Europe

- Availability of software:
  - Thourough test have been conducted to test the interoperability of OFTP2 software regarding basic OFTP2 functions and the automatic exchange of certificates according to the SCX recommendation

Axway	Seeburger
C-works	Trubiquity
Data Interchange	T-Systems
Hüngsberg	Xware
Numlog	

https://forum.odette.org/repository/OFTP2%20Software%20Products.pdf

This testing service is offered to other software comanies as well.

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Status of OFTP2 implementation in Europe

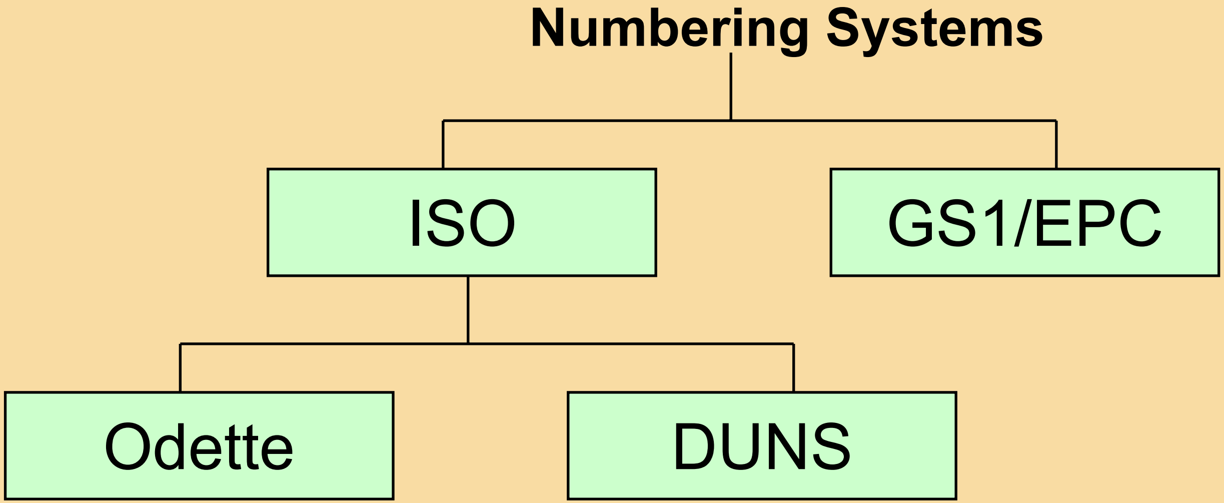
- OEMs who started operational use of OFTP2
  - BMW, Daimler, PSA, Skoda, Volkswagen, Volvo, (Daimler and Scania likely to follow soon)
  - Some start with CAD data others with commercial and CAD data
- Suppliers still hesitant to implement OFTP2
  - OEMs do not make pressure (yet)
  - But this is likely to change soon, when the first OEM requires OFTP2

The role of Odette as a Trust Centre

- This function is realised by the Odette community, i.e the Central Office and the National Organisations
- Odette has close links to the industry in our countries and can meake sure the system is facilitated and maintained to fit exactly to the needs of the automotive supply chain.
- Odette is a no-profit organisation and provides the service to members free of charge

OSCAR: Odette System for Coding And Registration

- The Oscar system provides:
  - An issuing service (issuing codes)
  - An information service (a user can query information on the registered entity)
- ISO compliant



Usage of OSCAR Codes

AutoID

- Consignment ID (Licence Plate)
- Asset ID (e.g. Containers)
- Product ID (Parts Marking)

EDI messaging

- Technical Partner ID (Sender/Receiver)
- Business process related Party ID (NAD ID)

Organisation codes:
Trading partners
Locations, business functions and departments within a company
Logistics handling units
Company Assets
Individual parts/components
Computer network addresses
Engineering changes

File transfer station identification (OFTP)

ISO ID					OFTP code from the OSCAR System														Sub address					
0	0	1	7	7	0	0	0	0	0	0	0	0	0	0	X	0	0	A	0	0	0	0	0	0

Maintain Business Entity Datasets

Provide Business Entity Datasets for use in Partner Databases

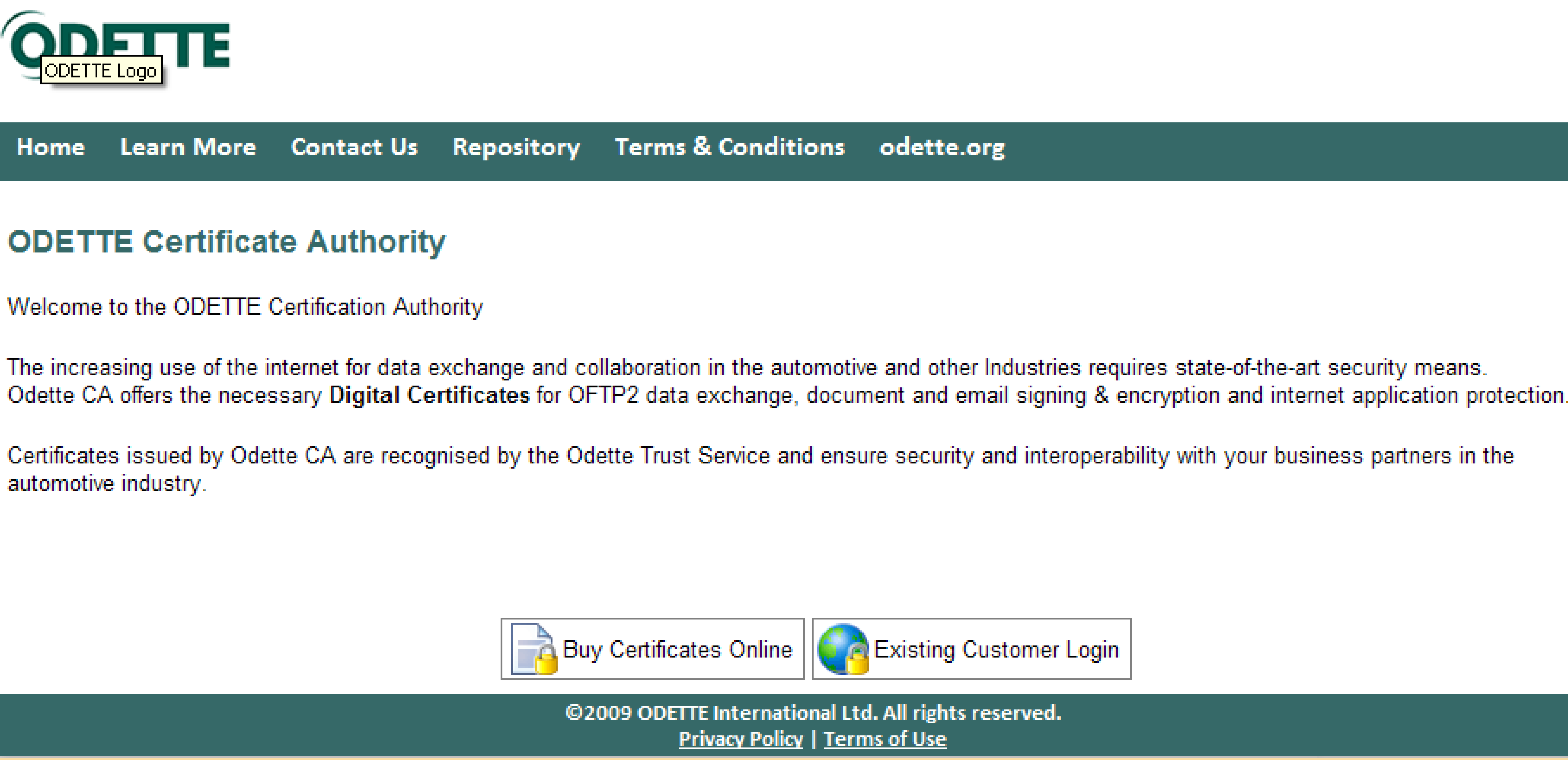
Advantages of OSCAR

- More flexible then DUNS
  - Business units / entities beyond legal entities
- Cheaper than GS1/EPC
- Short enough for parts marking and RFID applications
- Alphanumeric – 4 Characters for main and additional 2 characters for sub-codes (1679616 main and 1296 sub-codes per main code)
- Tailor-made for the automotive industry

Odette CA

- Established to provide all items necessary for a reliable data exchange in the automotive industry manged by the Odette organisation
- Easy to use
- State of the art certificates, may even include the Odette ID of the station
- „One stop shop“ principle

https://www.odetteca.com/



ODETTE Certificate Authority

Welcome to the ODETTE Certification Authority

The increasing use of the internet for data exchange and collaboration in the automotive and other Industries requires state-of-the-art security means. Odette CA offers the necessary **Digital Certificates** for OFTP2 data exchange, document and email signing & encryption and internet application protection.

Certificates issued by Odette CA are recognised by the Odette Trust Service and ensure security and interoperability with your business partners in the automotive industry.

There is also information available in Swedish on the Odette Sweden website about how to register

ODETTE SWEDEN

Price List

OSCAR code for OFTP only:
175 EUR per OFTP code, no maintenance fee
Entitles to get 1 Odette Certificate for one year for free.

Full OSCAR Code (for All Purposes)
MBE Code 180 EUR each
SBE Codes (can be generated by Users free of charge)
Annual Maintenance: 96 EUR per MBE Code

Odette Certificate for OFTP2 (but also usable for other purposes):
Certificate 180 EUR
Annual Renewal 180 EUR

Adresses

www.odette.se
https://oscar.odette.org/
https://forum.odette.org/service/oscar/oscar-explained
www.odetteca.com